



# Agenda Item 2 : OVERVIEW OF FREQUENCY MANAGEMENT IN AFI REGION

**INTERNATIONAL  
CIVIL AVIATION  
ORGANIZATION**



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# ICAO Regional Officers CNS ESAF and WACAF

# Outline

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## 01

### Introduction

Session objectives  
Importance of effective Aeronautical frequency management

## 02

### ICAO Provisions Governing Aeronautical Spectrum

ICAO provisions  
ITU Framework for Aeronautical Spectrum  
How ICAO and ITU Interact

## 03

### AFI Regional Context

AFI Regional Spectrum requirements  
Frequency management key principles  
Frequency Databases

## 04

### Regional challenges

## 05

### Conclusion

Key takeaways


# 01

## Introduction



# 1. Introduction

## 1.1 Main objective



Provide an overview of the regulatory framework and regional context guiding aeronautical frequency management in the AFI Region.

# 1. Introduction

## 1.2 Specific Objectives of the presentation



Explain the ICAO provisions and ITU framework governing aeronautical spectrum.



Clarify how these provisions apply to frequency management in the AFI Region



Identify the main regional challenges and priorities that require coordinated action by AFI States

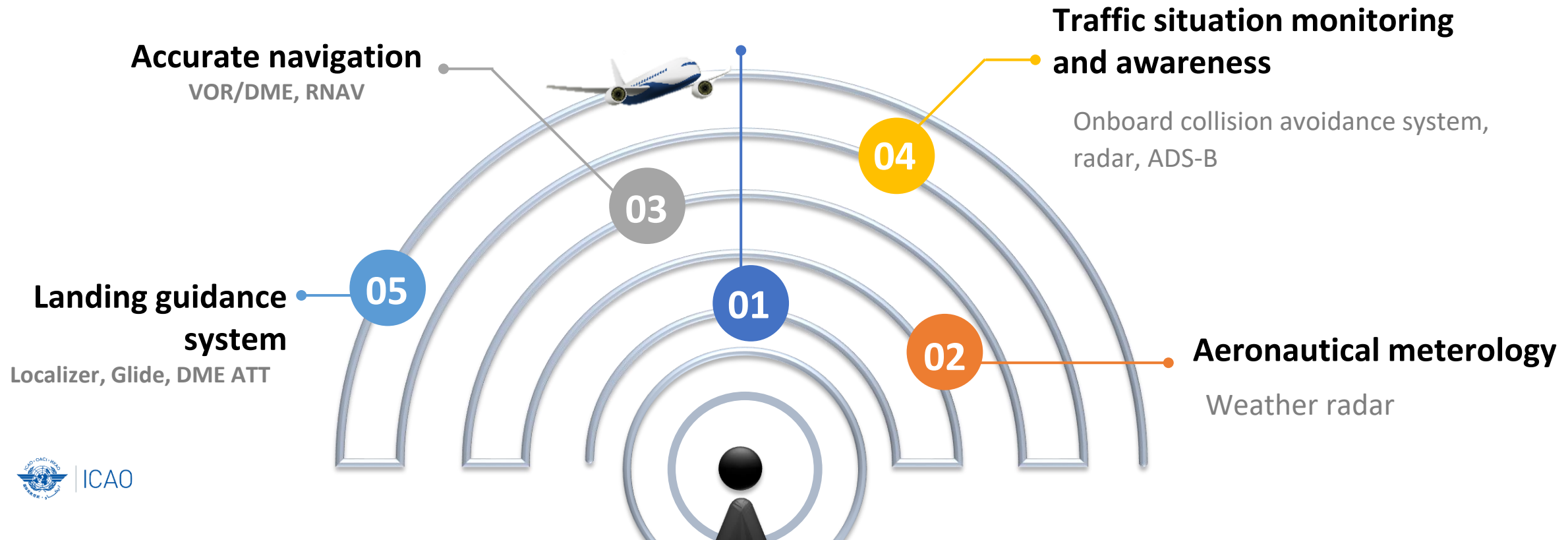
# 1. Introduction

## 1.3 Spectrum is critical to the safe flight of aircraft

Safe flight operations require reliable, continuous, and secure access to the aeronautical frequency spectrum.

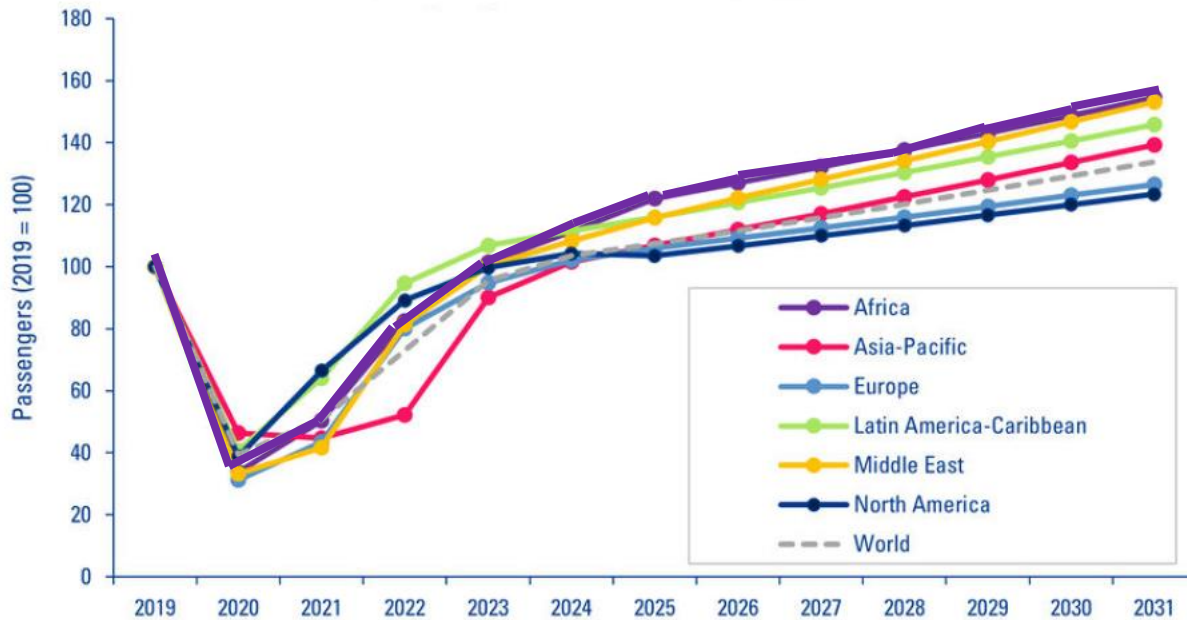
### reliable communications

between pilots and air traffic controllers



### Global Air Traffic growth will intensify pressure on Aeronautical Spectrum

**Medium-Term Passenger Traffic Forecast by Regions**  
(indexed, 2019 = 100)



Source : ACI World Airport Traffic Forecasts (WATF) 2025-2054 – Executive summary



### Global Growth

- ✓ 10.2 billion passengers in 2026 (+3.9% YoY)
- ✓ 23.2 billion passengers by the mid-2040s
- ✓ 3% CAGR (2024–2054)
- ✓ 2.5× today’s traffic levels by 2054



### Africa – Key Figures (Highlight)

- ✓ 754 million passengers by 2054
- ✓ +3.6% CAGR (2024–2054)
- ✓ 274 million passengers in 2025 (+9.6% YoY — to be confirmed by ACI World in July 2026)

👉 Africa = high-growth region → rising and sustained pressure on CNS spectrum capacity

# 1. Introduction

## 1.4 Why is Aeronautical Frequency Spectrum Management important?



### Spectrum management

Finite and safety-critical resource facing increasing pressure from expanding aeronautical and non-aeronautical demands.

- ✓ Combination of administrative and technical procedures
- ✓ Essential for ensuring safe, interference-free and efficient operation of aeronautical communication and navigation services.

# 02

## ICAO provisions governing Aeronautical Spectrum

ICAO provisions  
ITU Framework for  
Aeronautical Spectrum  
How ICAO and ITU Interact





# ANNEX 10 - AERONAUTICAL TELECOMMUNICATIONS



**Volume 1 - Radio Navigation Aids**

**Volume 2 - Communication Procedures including those with PANS Status**

**Volume 3 - Communication Systems**



**Volume 4 - Surveillance and Collision Avoidance Systems**

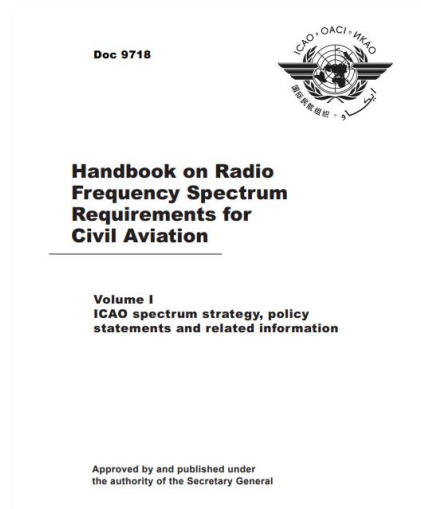
**Volume 5 - Aeronautical Radio Frequency Spectrum Utilization**

**Volume 6 : Communication Systems and Procedures Relating to Remotely Piloted Aircraft Systems C2 Link**

## 2. ICAO Provisions governing Aeronautical Spectrum

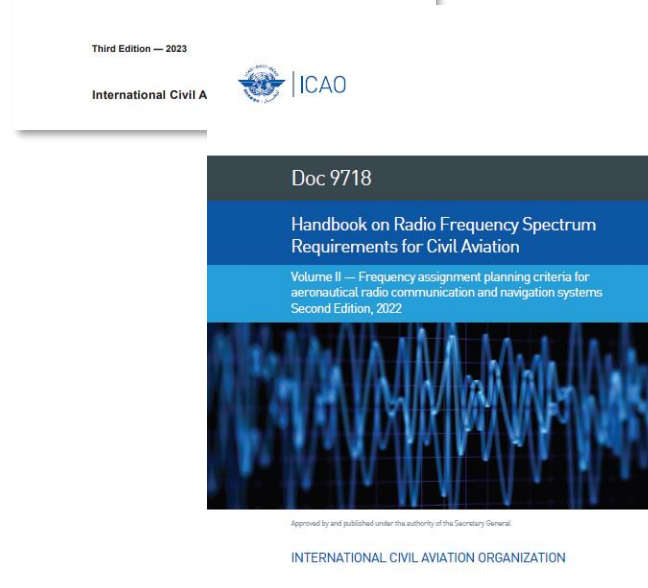
### 2.2 Handbook on Radio Frequency Spectrum Requirements for Civil Aviation – DOC 9718

- ✓ Detailed guidance material on the provisions in Annex 10 for CNS systems
- ✓ Two volumes :



#### Doc 9718 – Volume I: ICAO Spectrum Strategy and Policy

- ✓ contains material relevant to the allocation and use of aeronautical frequency bands by the ITU.



#### Doc 9718 – Volume II: Frequency Planning and Management

- ✓ contains material relevant to the frequency assignment planning for CNS systems

## 2. ICAO Provisions governing Aeronautical Spectrum

### 2.3 Key ICAO principles for Frequency management

#### Vision

Long-term spectrum availability to support evolving CNS/ATM systems and global air transport safety and efficiency.

#### Key Principles

1

Aeronautical spectrum is a finite, protected resource



2

Assignments must be safe, efficient, coordinated, and accurately reported



3

States ensure compliance with ICAO and ITU rules



## 2. ICAO Provisions governing Aeronautical Spectrum

### 2.4 Relationship between ITU radio regulations and other material and ICAO SARPs

The ITU Radio Regulations have treaty status, and States are obligated to apply them unless a specific exception is recorded in the Final Acts of the conference that adopted the provision.

Aeronautical services must operate within the framework established by the Radio Regulations.



## 2. ICAO Provisions governing Aeronautical Spectrum

### 2.4 Relationship between ITU radio regulations and other material and ICAO SARPs



#### The Radio Regulations

- ✓ ensure that radiocommunication systems operate without harmful interference and that all ITU Member States benefit from fair access to spectrum resources
- ✓ complement the ITU Constitution and Convention, forming the foundation of the global framework for:
  - management of the radio frequency spectrum,
  - protection of existing radio services, and
  - enabling the introduction of new and enhanced radiocommunication services.



#### The Radio Regulations ICAO SARPs – Annex 10

- ✓ Support the safety and regularity of air navigation
- ✓ Define interface, interoperability, and performance requirements for internationally used aeronautical communication, navigation, and surveillance systems
- ✓ Include aviation-specific procedures for routine and emergency communications, taking account of the operational conditions

*These procedures supplement the basic requirements of the Radio Regulations for procedures in aeronautical communications.*

- ✓ RR and SARPs are complementary, not overlapping.
- ✓ RR evolve within the global telecom environment, serving many spectrum users.
- ✓ SARPs focus on aviation safety and operational standards, developed and agreed within ICAO.

# 03

## AFI Regional Context

3.1 Frequency Spectrum management regional requirements in AFI eANP

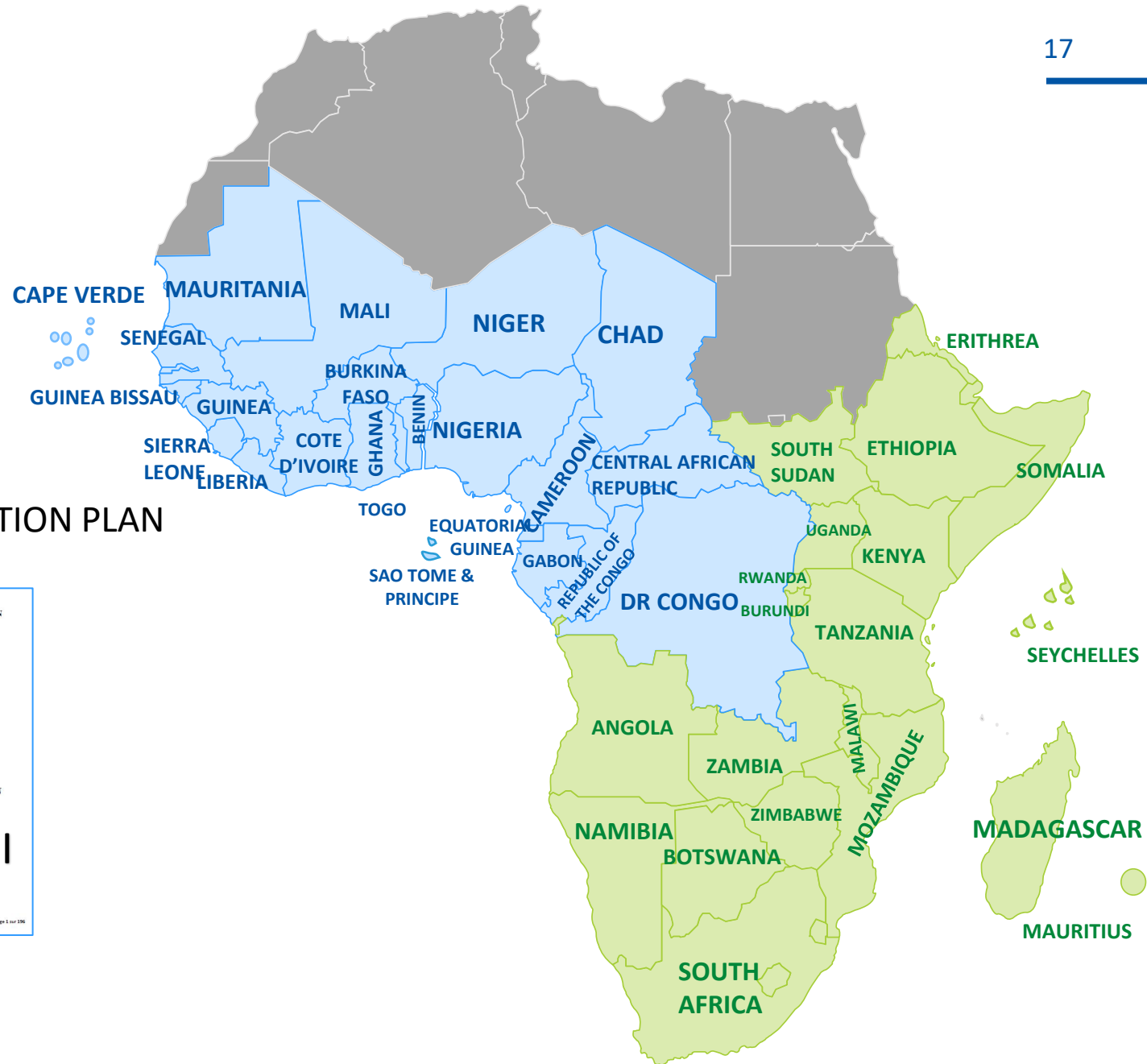
3.2 Regional allotment tables

3.3 Aeronautical Frequency Coordination – Key highlights

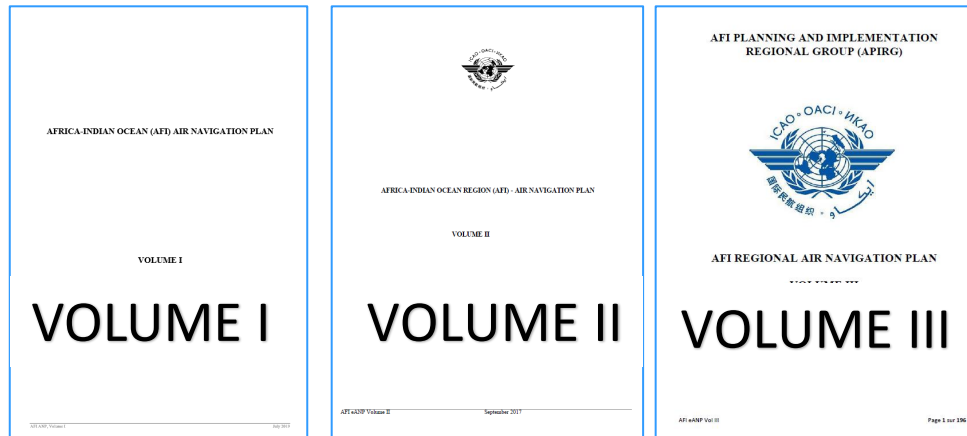


# 3. AFI Regional Context

## 3.1 Frequency Spectrum management regional requirements in AFI eANP



### AFRICA-INDIAN OCEAN REGION (AFI) - AIR NAVIGATION PLAN



# 3. AFI regional Spectrum context

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## GENERAL REGIONAL REQUIREMENTS

### 3.1 Frequency Spectrum management regional requirements in AFI eANP

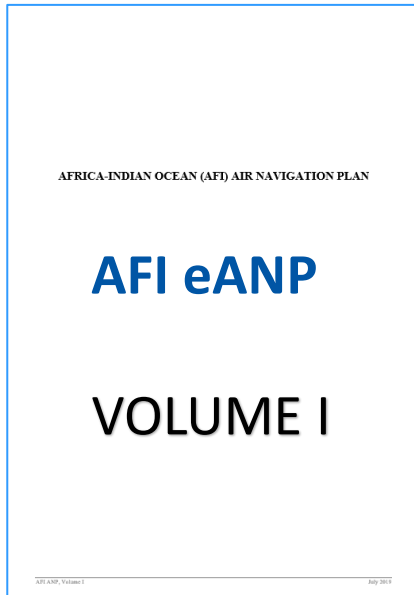
**§2.4 “Air-ground communications for ATS”**...should be so designed to require the least number of frequency and channel changes for aircraft in flight... and provide for **optimum economy in the frequency spectrum** used for this purpose.”



**§2.5 Air-ground data link communications** : “...should be implemented in such a way that they are regionally and globally harmonised and make efficient use of available communication means and ensure **optimum economy in frequency spectrum use** and system automation.”



**§2.9 Frequency management:** “**Frequency assignment planning in the Region(s)** should be carried out in accordance with the provisions of Annex 10 and ICAO **Handbook** on Radio Frequency Spectrum for Civil Aviation (Doc 9718), supplemented, as necessary, by regional recommendations and technical criteria developed for this purpose.”



# 3. AFI regional Spectrum context

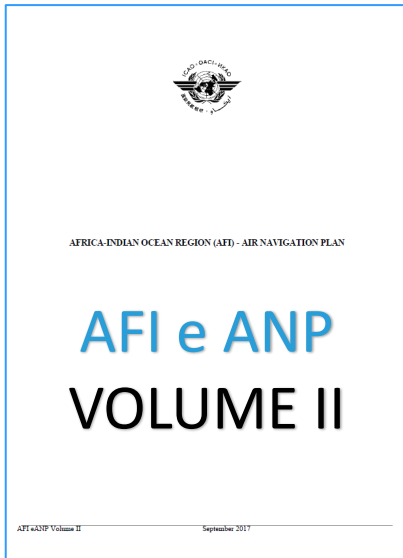
## 1

### 3.1 Spectrum management regional requirements in AFI eANP

#### PART III – COMMUNICATIONS, NAVIGATION AND SURVEILLANCE (CNS)

#### GENERAL REGIONAL REQUIREMENTS

#### Aeronautical Mobile Service AMS (VHF COM)



(§2.45 a–d)	Assign per ICAO criteria (Annex 10 Vol V; Doc 9718 Vol I & II) with: 25 kHz interleaving separation, VDL separation, spectrum economy, and interference-free international services.)
§2.46	Priority order for VHF assignments: 1.ATS international (ACC/APP/TWR/FIS), 2) ATS national, 3) VOLMET international, 4) ATIS & PAR, 5) other non-ATS.
§2.47	Use the same planning criteria for national VHF AMS as for international facilities.
§2.49	Extend VHF coverage via VSAT remotes where needed; encourage bilateral/MoU site-sharing to ensure continuity across FIR boundaries.
§2.50	Keep each air-ground frequency within its declared coverage; verify that sites meet operational coverage considering terrain.

# 3. AFI regional Spectrum context

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## GENERAL REGIONAL REQUIREMENTS



### 3.1 Spectrum management regional requirements in AFI eANP

#### PART III – COMMUNICATIONS, NAVIGATION AND SURVEILLANCE (CNS)

##### Aeronautical Radio Navigation Aids - ARNS (NAV)

§2.51	Assign per ICAO criteria (Annex 10 Vol V; Doc 9718 Vol I & II) using agreed separation for ILS LLZ, VOR, GBAS and DME X/Y channeling; ensure spectrum economy and interference-free international services.
§2.52	Apply the same principles used for international NAV aids to national NAV aids where practicable.

##### Coordination with ICAO RO for Frequency assignment

§2.53	Coordination with ICAO Regional offices for Aeronautical Frequencies and Interrogator Identifier (II) Codes assignment and use of ICAO Frequency Finder tool
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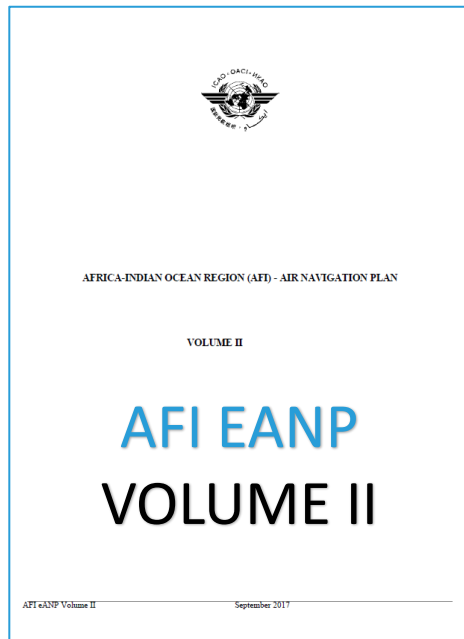
##### Support to ICAO Positions for ITU World Radiocommunication Conferences (WRCs)

§2.54	Support ICAO's position at ITU WRCs to protect current aeronautical spectrum and secure needed allocations for future aviation systems.
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# 3. AFI regional Spectrum context



## SPECIFIC REGIONAL REQUIREMENTS



## 3.1 Spectrum management regional requirements in AFI eANP

### PART III – COMMUNICATIONS, NAVIGATION AND SURVEILLANCE (CNS)

#### §3.4 Spectrum

§3.4.1	AFI aeronautical satellite networks rely on the C-band (3.4–4.2 / 5.625–6.425 GHz) as the only reliable option for high-availability links in tropical regions due to heavy rain attenuation at higher frequencies
§3.4.2	The C-band (3.4–4.2 GHz) faces interference risks from IMT systems, and AFI States must apply ITU WRC-15 Resolution 154 to protect fixed-satellite service earth stations essential for safe aeronautical and meteorological operations









## 3. AFI regional Spectrum context

### 3.3 Aeronautical Frequency Coordination – Key highlights







#### Regional Office – Spectrum and IC Coordination

-  Central point for frequency and IC coordination
-  Defend ICAO spectrum position
-  Coordinate frequency assignments
-  Support cross-border interference resolution
- Maintain regional frequency lists
-  Manage Interrogator Codes (IC)
-  Guide States on interferences, GNSS RFI issues



#### States

-  Submit frequencies & SSR/IC for international coordination
-  Coordinate nationally with ITU and spectrum/telecom authorities
-  Comply with ICAO/ITU & AFI Allotment Table and protect aeronautical spectrum
-  Use Frequency Finder (FF) for selection, compatibility checks, and global registration

04

# Regional Challenges



# 4. Regional challenges and emerging spectrum Issues

## Main challenges



### VHF persistent interference

- ✓ Harmful interference to air-ground communications from unauthorized transmissions and FM broadcast spillover
- ✓ Need to increase coordination with radio regulatory and enforcement authorities



### GNSS Radio Frequency Interference (RFI) incidents

- ✓ Increasing GNSS RFI Events and Absence of Formal/harmonized Reporting Systems
- ✓ Reinforcing civil-military coordination to address interference risk associated with GNSS testing and conflict zones



### 5G/IMT adjacent-band risks

- ✓ Potential harmful interference to Radio Altimeters (4200–4400 MHz)
- ✓ C-Band protection for AFI VSAT aeronautical networks remains essential.



### VHF Coverage gaps

- ✓ Several remote or oceanic areas still experience VHF coverage gaps
- ✓ Modernization and investment must be strengthened to ensure resilient CNS services



### Need for State frequency database updates

- ✓ Recent CNS Section of ICAO HQ Frequency data quality control revealed update needs
- ✓ Timely action by States is required.



## 4. Regional challenges

### Opportunities



Ensure timely completion of frequency data updates and verification for onward submission to ICAO HQ



Promote WRC-27 awareness by broadly sharing ICAO's Position with all national spectrum and telecommunications authorities.



Enhance GNSS RFI resilience through best-practice sharing, updated guidance, and regional GNSS interference procedures.



Reinforce regional coordination by actively participating in AASPG IIM Sub-Group spectrum activities.

## 4. Regional challenges

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### Opportunities



Ensure AFI-wide harmonization of frequency planning practices.



Strengthen national coordination with telecom authorities for interference resolution (MoUs, joint procedures) and ensure active CAA participation in national and regional WRC preparatory activities.

# 06

## Conclusion



## 6. Conclusion

### Key takeaways



ICAO and ITU frameworks jointly safeguard aviation spectrum and ensure interference-free CNS operations.



Compliance with Annex 10, Doc 9718, and ITU RR is essential for consistent spectrum management across AFI.



AFI faces increasing spectrum pressure: VHF congestion, GNSS RFI, cross-border interference, and variable national practices.



Regional harmonization is needed to strengthen planning, coordination, and data accuracy.



Rising air traffic and new CNS technologies will further increase spectrum demand—requiring proactive protection

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# Thank You

